TECHNICAL SUPPORT DOCUMENT FOR ELECTRICITY PURCHASES: PROPOSED RULE FOR MANDATORY REPORTING OF GREENHOUSE GASES

Office of Air and Radiation
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1. Source Description

The electric utility sector is the largest emitter of GHG emissions in the United States. The level of GHG emissions associated with electricity use is determined not just by the fuel and combustion technology onsite at the power plant, but also by customer demand for electricity. Accordingly, electricity use and the efficiency of this use at industrial facilities indirectly affect the emissions of CO_2, CH_4 and N_2O from the combustion of fossil fuel at electric generating stations.

For many industrial facilities, purchased electricity represents a large part of onsite energy consumption, and their overall GHG emissions footprint when taking into account the indirect emissions from fossil fuel combusted for the electricity generated. Therefore, the reporting of electricity purchase data from industrial facilities can provide a better understanding of energy usage in the economy and the major industry sector.

The collection of electricity purchase data would benefit a wide variety of future complementary GHG program design decisions. In many energy intensive sectors production metrics, such as electricity usage, are used to help verify reported emissions data. Including purchased electricity from these sources provides more accurate production intensity data, especially from industries where electricity and fuel use are equally critical. Data from purchased electricity can be critical in designing performance benchmarks for these energy intensive sectors and could be used to set minimum or incentive-based performance standards for various energy-intensive industries. In addition, many large electricity consumers such as data centers or large commercial buildings may not be included in a GHG mandatory reporting program if purchased electricity data are not included. Requiring these companies to report either purchased electricity or the GHG emissions attributed to their electricity purchases would encourage energy efficiency and reduce GHG emissions.

The inclusion of indirect GHG emissions (i.e., emissions from the purchase of electricity) would be consistent with the direction of current state-level GHG mandatory and voluntary reporting programs, such as the California Air Resources Board (CARB), The Climate Registry, and the long history of corporate voluntary reporting, and would help maintain the consistency and scope of corporate GHG emissions data over time.

2. Total Emissions (Based on Inventory)

National emissions from the generation of electricity from fossil fuels (U.S EPA 2008) totaled 2,328 million metric tons of CO_2e ($MMTCO_2e$) in 2006. Electricity-related emissions are largest in the residential sector (843 $MMTCO_2e$) and commercial sectors (810 $MMTCO_2e$), followed by the industrial sector (658 $MMTCO_2e$), agriculture sector (62 $MMTCO_2e$), and the transportation sector (5 $MMTCO_2e$).

3. Review of Existing Programs and Methodologies

Most reporting programs require reporting of indirect emissions and are based on the GHG protocol established by the World Resources Institute and World Business Council for Sustainable Development (WRI/WBCSD). Data on electricity purchases and use are typically readily available to large companies.

- EPA Climate Leaders/The Climate Registry/California Climate Action Registry programs all use EPA Emissions & Generation Resource Integrated Database (eGRID) data to calculate GHG emissions from electricity use. Transmission and Distribution (T&D) losses are assigned to T&D companies.

- The Department of Energy (DOE) 1605(b) Voluntary Reporting of Greenhouse Gas Emissions Program uses state-based Energy Information Administration (EIA) factors that include T&D losses to calculate GHG emissions from electricity use.

- The United Kingdom's Carbon Reduction Commitment (CRC) program uses a single national grid emission factor for all

4. Type of Emissions Information to be Reported

Considering the design of current GHG emissions reporting programs with respect to electricity data and indirect emissions, the following information could be reported:

- Facility-level electricity purchased data in standard units, such as kilowatt hour (kWh), and/or
- Facility-level indirect emissions calculated from the electricity purchased data, in units of $MMTCO_2e$. This data could be calculated using collected electricity purchased data and standard emission factors.

5. Options for Reporting Threshold

The following options were considered for the reporting of indirect emissions from the purchase of electricity:

- Option 1: Do not require the reporting of indirect emissions from any facility.

- Option 2: Require reporting on electricity purchases (kWh) only from those facilities that will already be required to report GHG emissions data. Although indirect emissions data would not be directly reported, this option would enable indirect emissions for facilities to be calculated. This option would be the least burdensome to reporting facilities since the data are easily available to reporters. No additional facilities would be impacted with this option.

- Option 3: Require reporting of indirect emissions from all facilities where annual facility CO_2-equivalent emissions from electricity purchases combined with the emissions from the facility's direct emission sources exceed one of the following thresholds:
    - 100,000 tons CO_2-equivalent facility emissions (approximately 250 facilities affected)
    - 25,000 tons CO_2-equivalent facility emissions (approximately 5,000 facilities affected)
    - 10,000 tons CO_2-equivalent facility emissions (approximately 15,000 facilities affected)
    - 1,000 tons CO_2-equivalent facility emissions (approximately 185,000 facilities affected)

The number of affected facilities for Option 3 above includes both industrial and non-industrial facilities that would be subject to report indirect emissions from electricity purchases.

The analysis in Table 1 below is a preliminary screening to gauge the magnitude of the impacts for industrial facilities, which was developed to support how many additional facilities would be impacted by the requirements of Option 3. These calculations include emissions from electricity purchases only. The information provided in Table 1 was gathered from the Department of Energy, Energy Information Administration, Office of Energy Markets and End Use, Energy Consumption Division, Form EIA-846, "2002 Manufacturing Energy Consumption Survey", and Office of Oil and Gas, Petroleum Supply Division, Form EIA-810, "Monthly Refinery Report" for 2002, and the Bureau of the Census, data files for the "2002 Economic Census, Manufacturing - Industry Series."

Table 1. Preliminary Screening of Impacts for Industrial Sectors

Source Category	Emissions Level	Total National Emissions	Total National Establishments	Emissions Covered		Establishments Covered	
	$mtCO_2e$	MMT CO_2e	Number	MMT CO_2e	Percent	Number	Percent
All Manufacturing Industries	>1,000	586.6	350,828	526.5	90%	61,605	18%
	>10,000	586.6	350,828	343.6	59%	11,433	3%
	>25,000	586.6	350,828	232.6	40%	4,981	1%
	>100,000	586.6	350,828	46.7	8%	251	0%

6. Options for Monitoring Methods

The following monitoring methods are provided for each of the possible reporting threshold options.

6.1. Monitoring Methods for Option 1

There are no monitoring requirements for Option 1.

6.2. Monitoring Methods for Option 2

No calculations would be required for reporting, as facilities would report only total electricity purchased data in standard units (i.e., kWh).

The monitoring method for this option would involve the facility-level summation of electricity purchased data on an annual basis. The total facility electrical purchased data would be based on electricity supplier receipts or records, and/or facility meter data. Several steps of this method would be necessary:

1) Each facility would need to internally develop the methodology and monitoring plan for collecting total electricity purchase data.
2) Facility managers would be required to collect data on electricity purchased for all buildings and operations located at the facility annually.
3) Each facility would be required to conduct quality assurance and quality control of the electricity purchase information and any supplier's information. This procedure would be conducted annually.

These required activities would involve labor hours for industrial managers, industrial engineers/technicians, administrative support, and lawyers. There is no capital cost involved in this monitoring method.

6.2. Monitoring Methods for Option 3

The monitoring methods for this option are the same as provided above for Option 2. However, in addition to the monitoring methods of Option 2, facilities would have to calculate their indirect emissions from electricity usage. Indirect emissions are calculated using default emission factors for mass of CO_2, CH_4 and N_2O per MWh of electricity use. Default emission factors are based on average emission rates that best represent the electricity actually purchased. The U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database (eGRID) provides default emission rates in varying level of detail including by generating company, states, North American Electric Reliability Council (NERC) regions, and U.S. average.

Calculations of indirect emissions follows the equation:

$$E_{CO2e} = \Sigma(EF_i * \text{Electricity Purchases})$$

Where:
E_{CO2} = Emissions of CO_2
EF_i = Emissions factor for CO_2, CH_4 or N_2O

7. Options for Estimating Missing Data

It is assumed that a facility will likely be able to supply facility-level electricity purchases. However, in the event that electricity purchase data are missing the facility would estimate its electricity usage for the missing data period based on historical data (i.e., previous electricity purchase records). If a facility is using electric meter data and has a missing data period, the facility would estimate purchased electricity based on electricity provider records and historical meter data. Any historical data used to estimate missing data should represent similar circumstances to the period over which data are missing (e.g., seasonal).

8. QA/QC Requirements

Facilities should conduct quality assurance and quality control (QA/QC) for electricity supplier receipts or records, and/or facility meter data. Facilities are encouraged to prepare an in-depth quality assurance and quality control plan which would include checks on electricity purchases data, and calculations performed. Some examples of specific QA/QC procedures to include in a QA/QC plan are:

- Check for temporal consistency in purchased electricity data,
- Determine the "reasonableness" of the data estimate by comparing it to previous year's estimates,
- Maintain data documentation, including comprehensive documentation of data received through personal communication, and
- Compare supplier provided electricity purchases data versus internal meter data.

9. References

IPCC (2006) *2006 IPCC Guidelines for National Greenhouse Gas Inventories.* The National Greenhouse Gas Inventories Programme, The Intergovernmental Panel on Climate Change, H.S. Eggleston, L. Buenida, K. Miwa, T Ngara, and K. Tanabe (eds.). Hayama, Kanagawa, Japan.

U.S. EPA (2008) *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006.* U.S. Environmental Protection Agency, Washington D.C. USEPA #430-R-08-005.

The Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard, Revised Edition, World Resources Institute and World Business Council for Sustainable Development.

EPA Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance, Indirect Emissions from Purchases/Sales of Electricity and Steam.